

## **AMENDMENTS TO THE DRAWINGS**

The attached New Sheet includes FIGS. 8 and 9.

## **REMARKS**

Claims 1-20 are now pending in the application. New dependent claims 13-20 are added. Claim 9 is indicated as being allowable if rewritten in independent form. Accordingly, Applicant has amended claim 9 to include features of the base claim 1, as claim 9 depended directly from claim 1 without any intervening claims. Therefore, claim 9 should now be in condition for allowance.

The Examiner is respectfully requested to reconsider and withdraw all objections and rejections in view of the amendments and remarks contained herein.

## **DRAWINGS**

In the Office Action, the drawings have been objected to under 37 CFR 1.83(a) for not showing a multi-layer flex film (as recited in claim 7) and a foldable phone (as recited in claim 11). Applicant respectfully submits that the application as originally filed included sufficient disclosure to enable one having ordinary skill in the art to understand the features recited in claims 7 and 11.

See, for example, paragraph [0044] of the application describing the manner in which the radiating elements 10, 20 may be provided on one side of a multi-layer flex film and the conductive sheet 34 can be provided on the other side of the multi-layer flex film.

See also, for example, paragraph [0039] of the application describing the manner in which the PIFA antenna (shown in FIG. 2) may be used in a foldable phone.

This notwithstanding, and for purposes of expediting prosecution, Applicant files herewith FIGS. 8 and 9 (labeled New Sheet), that respectively illustrate an example foldable phone and multi-layer flex film. More specifically, FIG. 8 illustrates an example foldable phone in which may be used the PIFA antenna device (shown in FIG. 2) comprising the radiating elements 10, 20 and switch 30.

FIG. 9 illustrates an example of a multi-layer flex film having the radiating elements 10, 20 (shown in FIG. 4) on one side of the multi-layer flex film and the conductive sheet 34 (also shown in FIG. 4) on the other side of the multi-layer flex film.

Applicant has amended the specification to add paragraphs [0025.1] and [0025.2] so as to include brief descriptions of FIGS. 8 and 9 in the application.

Given that the application as originally filed (*e.g.*, paragraphs [0039] and [0044]) describes a foldable phone and multi-layer flex film as illustrated in respective FIGS. 8 and 9, no new matter is added by FIGS. 8 and 9. Accordingly, Applicant respectfully requests entry of FIGS. 8 and 9 and the removal of the objections to the drawings.

#### **ABSTRACT**

Applicant has amended the ABSTRACT per the Examiner's suggestions.

#### **CLAIM OBJECTIONS**

The amendments to claims 5 and 9 have rendered moot the objections thereto. Specifically, amended claim 5 now only depends from claim 1 (not claims 1-4). Amended claim 9 no longer recites any reference numbers.

#### **REJECTION UNDER 35 U.S.C. § 102**

Claims 1-8 and 10-12 stand rejected under 35 U.S.C. § 102(b) as being anticipated<sup>1</sup> by *Rowell* (WO 01/20718 A1). This rejection is respectfully traversed.

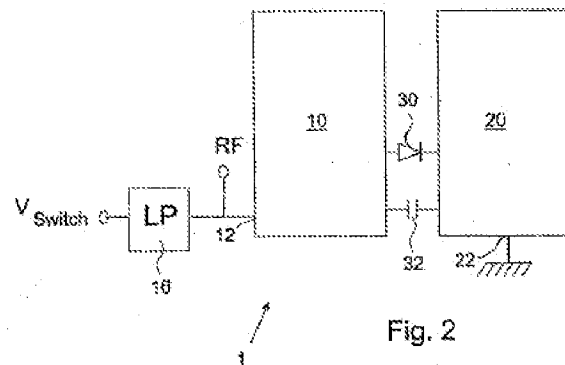
#### ***Independent Claims 1 and 10***

Independent claims 1 and 10 have been amended to clarify that the “high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable as one single radiating element.” As explained herein, claims 1 and 10 are not anticipated by *Rowell* because *Rowell* does not disclose an antenna device in which “a high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable as one single radiating element.” In contrast, *Rowell's* radiating elements are connected and disconnected from each other by means of the switch (460) and are isolated from each other (as explained below).

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<sup>1</sup>See MPEP § 2131 states that for a reference to anticipate a claim, “the identical invention must be shown in as complete detail as is contained in the...claim” and that “the elements must be arranged as required by the claim.”

The amendment to claims 1 and 10 herein are supported by the application as originally filed. See, for example, FIG. 2 (reproduced below) illustrating an exemplary antenna device 1 that includes a high pass filter, shown as a capacitor 32, that allows RF signals to pass such that the two radiating elements 10, 20 from an RF point of view is one single element. See also paragraph [0030] of the application as published under U.S. Patent Application Publication No. 2009/0066584, which states: "The first and second radiating elements 10, 20 are also capacitively interconnected by means of a high pass filter, shown as a capacitor 32 in the figures. The high pass filter allows RF signals to pass and this means that the two radiating elements from an RF point of view is one single element, as will be described further with reference to FIGS. 2a-c."



See also paragraph [0036] which states: "This is because the capacitor 32, operating as a high pass filter, functions as an "RF bridge" between the two radiating elements."

See also FIGS. 2a, 2b, 2c, 4, 5, 6, and 7 (of which FIGS. 4-7 are reproduced below). FIGS. 4-7 illustrate other examples of antenna devices with bridges between the radiating elements.

More specifically, FIG. 4 shows an embodiment of an antenna device wherein the capacitive bridge/coupling between the radiating elements 10, 20 is provided by means of a conductive sheet 34 provided under the part of the two radiating elements 10, 20 at the RF bridge location (as described in paragraphs [0021] and [0044]).

Fig. 4

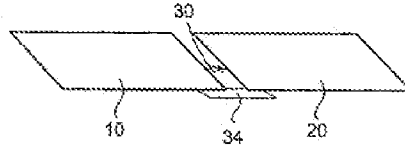


FIG. 5 shows another embodiment of an antenna device wherein the capacitive bridge/coupling between the radiating elements 10', 20' is provided by means of a meandering interface between the radiating elements 10', 20' (as described in paragraphs [0022] and [0045]).

Fig. 5

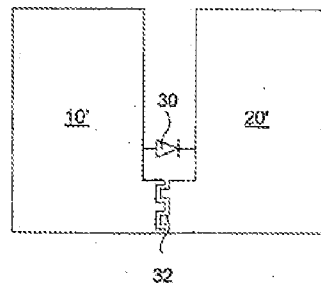


FIG. 6 shows another embodiment of an antenna device with alternative radiating element configurations. In this example, however, the antenna device operates as the antenna device illustrated in FIGS. 2 and 2a-c (see paragraphs [0023] and [0046]).

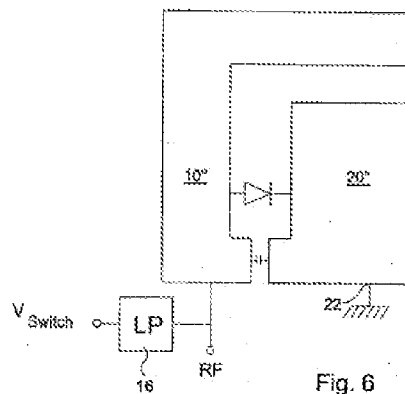
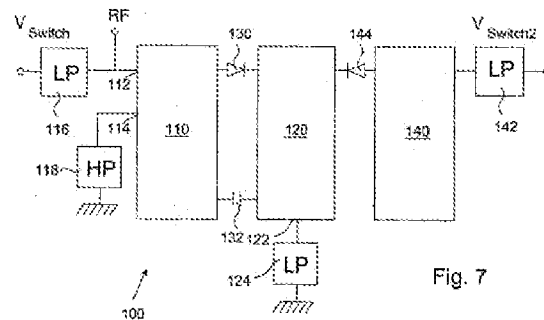


Fig. 6

FIG. 7 shows another embodiment of an antenna device in which there are three radiating elements 110, 120, 130. In this example (as described in paragraphs [0047]

through [0051]), the first and second radiating elements 110, 120 are interconnected by means of the capacitor 132 and resonate at a first frequency when the first switch 130 is open as in FIG. 7a. When the first switch 130 is closed as in FIG. 7b, the combination of the first and second radiating elements 110, 120 resonates at a second frequency.



See also paragraph [0030] of the application as published under U.S. Patent Application Publication No. 2009/0066584, which states: “The first and second radiating elements 10, 20 are also capacitively interconnected by means of a high pass filter, shown as a capacitor 32 in the figures. The high pass filter allows RF signals to pass and this means that the two radiating elements from an RF point of view is one single element, as will be described further with reference to FIGS. 2a-c.”

Accordingly, the amendments herein are supported by the application as originally filed. In addition, Applicant also notes that the European Patent Office (EPO) has granted the counterpart European patent EP 1 714 351 B1 with claims substantially identical to claims of the instant U.S. application. During the EPO prosecution, Applicant convinced the EPO to withdraw its claim rejections that were based upon *Rowell* (WO 01/20718 A1) for reasons similar to those set forth below.

### ***Rowell* (WO 01/20718 A1)**

In *Rowell*, the radiating element (321, 421, 621) is connected and disconnected from the other radiating element (322, 422, 622) by means of the switch (360, 460, 660). See, for example, *Rowell*'s FIGS. 3b, 4, and 6 reproduced below. *Rowell*'s antenna arrangements comprise switches, but they do not include any high pass filter connected between the first and second radiating elements. Accordingly, *Rowell* does

not anticipate claims 1 and 10, which recite “a high pass filter connected between said first and second radiating elements, which high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable as one single radiating element.”

Indeed, Rowell page 4, lines 20-25 specifically states that *Rowell's* patches are separated and isolated from each other, as follows: “the remaining patch(es) being isolated from the first patch.” This is contrary (and teaches away<sup>2</sup>) from what is recited in independent claims 1 and 10 about “a high pass filter connected between said first and second radiating elements, which high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable as one single radiating element.” By specifically disclosing and teaching separation and isolation of its patches, *Rowell* would lead one having ordinary skill in the art away from connecting a high pass filter between the patches. Thus, Rowell also does not render obvious claims 1 and 10.

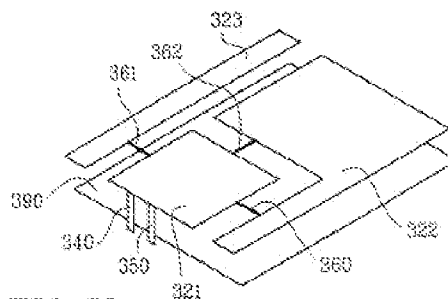


FIG. 3b

<sup>2</sup>See MPEP § 2145, Section X, subpart D, paragraph 2: References Cannot Be Combined Where Reference Teaches Away from Their Combination (“It is improper to combine references where the references teach away from their combination”).

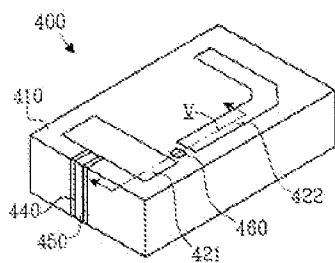


FIG. 4

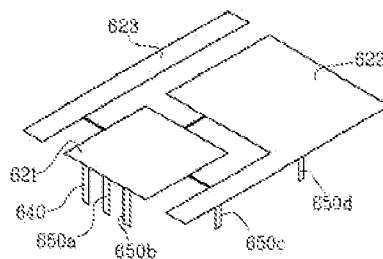


FIG. 6

According to the USPTO office action on page 4, *Rowell* discloses a “high pass filter (504) is connected between the first and second radiating elements, which high pass filter allows RF signals to pass...”. But in *Rowell*, the radiating elements (421, 422) are connected and disconnected from each other by means of the switch (460). *Rowell*’s capacitive element (504) is connected between the control signal and the ground as shown in FIG. 5 (reproduced below). On page 9, lines 13-18, *Rowell* specifically states:

Fig. 5 is a schematic cross-section along line V-V in fig. 4. The switch 460, for example a diode, is connected between the elements 421 and 422. In the carrier a hole 501 is arranged through which the switch is connected to a control signal via a resistor 503 and a LC network comprising an inductive element 502 and a capacitive element 504. The inductive element 502, e.g. an inductance, is arranged to eliminate the feedback of radiofrequency signals. The capacitive “element is arranged between the ground and the input signal.

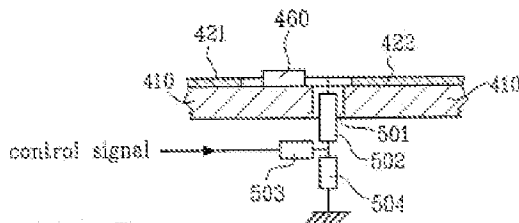


FIG. 5

Accordingly, *Rowell*’s capacitive element (504) is not “a high pass filter connected between said first and second radiating elements, which high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable



as one single radiating element” (as recited in independent claims 1 and 10). *Rowell's* capacitive element (504) does not provide an RF bridge for RF signals so that the radiating elements (421, 422) operate as one single radiating element. Instead, and as stated above, *Rowell's* capacitive element (504) is connected to ground.

As disclosed in Applicant's application (e.g., paragraphs [0036] through [0040]), the radiating elements of Applicant's exemplary antenna device 1 (shown in FIG. 2 above) operate or function as one element in both positions of the switch. In these examples, the connection tunes the antenna by changing the bridge between the elements; the bridge is present both when the switch is closed and when it is open. The geometry of the antenna is changed when the switch is connected/disconnected, and the frequencies of the antenna are adjusted as illustrated in FIG. 2c (reproduced below).

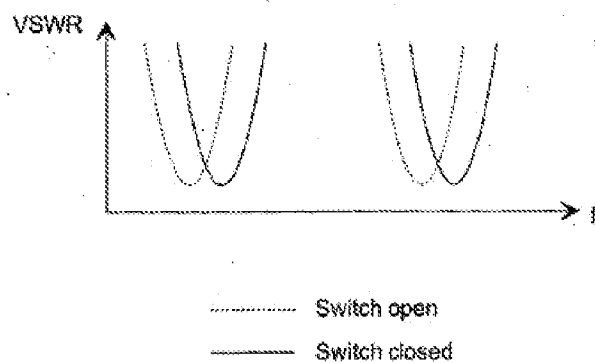


Fig. 2c

Independent claims 1 and 10 recite both a switch and a high pass filter between the antenna elements. The high pass filter connects the antenna elements. As described in the instant Application, with the switch open two resonant frequencies can be provided, as indicated by curves in FIG. 2c (reproduced above). And, when the switch is closed the resonant frequencies are "moved" as indicated by the dashed curves (in the same FIG. 2c). *Rowell's* antenna arrangement comprises a switch but does not include a high pass filter connected between the first and second antenna patches. Indeed, *Rowell* (page 4, lines 20-25) specifically discloses that *Rowell's* patches are separated and isolated from each other.

For all of the above reasons, Applicant submits that independent claims 1 and 10 are patentable over *Rowell* because the portions of *Rowell* identified in the Office Action do not disclose each and every feature of independent claims 1 and 10. The Examiner is respectfully requested to reconsider and withdraw the rejection of independent claim 1 and 10 (and all claims depending therefrom).

Applicant also respectfully submit that it would not be obvious to modify *Rowell* antenna arrangements to include “a high pass filter connected between said first and second radiating elements, which high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable as one single radiating element” (as recited in independent claims 1 and 10). This is because modifying *Rowell* (see FIG. 5 above) such that the capacitive element (504) is connected between the radiating would require a substantial reconstruction or redesign of *Rowell*’s antenna arrangement<sup>3</sup> and/or might render *Rowell*’s antenna arrangement inoperable or change its principle of operation.<sup>4</sup> Also, *Rowell* (page 4, lines 20-25) specifically states that *Rowell*’s patches are separated and isolated from each other as follows: “the remaining patch(es) being isolated from the first patch.” This is contrary (and teaches away) from what is recited in independent claims 1 and 10 about “a high pass filter connected between said first and second radiating elements, which high pass filter provides an RF bridge between the first and second radiating elements and thereby allows RF signals to pass, so that the first and second radiating elements are operable as one single radiating element.” By specifically disclosing and teaching separation and isolation of its patches, *Rowell* would lead one having ordinary skill in the art away from connecting a high pass filter between the patches. For at least these reasons, *Rowell* also does not render obvious claims 1 and 10 (or any claims depending therefrom).

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<sup>3</sup>See MPEP § 2143.01, Section VI (an obvious rejection is not proper where the modification would require a substantial reconstruction or redesign of the elements shown in the primary reference).

<sup>4</sup>See MPEP § 2143.01, Sections V and VI (If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose or would change the principle of operation of the prior art invention, then there is no suggestion or motivation to make the proposed modification).

### ***Dependent claims 2-8, 11, and 12***

Claims 2-8 depend from independent claim 1 and are submitted as novel, unobvious, and patentable over *Rowell* for at least the same reasons as stated for claim 1. Claims 11 and 12 depend from independent claim 10 and are submitted as novel, unobvious, and patentable over *Rowell* for at least the same reasons as stated for claim 10. Moreover, the portions of *Rowell* cited in the Office Action do not disclose, teach, or suggest each and every feature recited in dependent claim 2-8, 11, and 12 in combination with the features recited in claim 1 or 10 from which they depend. Reconsideration and allowance of pending claims 2-8, 11, and 12 are respectfully requested.

### **ALLOWABLE SUBJECT MATTER**

The Examiner states that claim 9 would be allowable if rewritten in independent form. Accordingly, Applicant has amended claim 9 to include features of the base claim 1, as claim 9 depended directly from independent claim 1 without any intervening claims. Therefore, claim 9 should now be in condition for allowance

### **NEW CLAIMS 13-20**

New claims 13-20 are added herein and are supported by the application as originally filed. Accordingly, no new matter is introduced by the addition of these claims.

Support for claim 13 may be found, for example, at FIG. 7 and paragraphs [0047] through [0051] of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 14 may be found, for example, at FIG. 2 and paragraph [0030] of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 15 may be found, for example, at FIG. 3, paragraphs [0028], [0029], [0031], and [0053], and claim 1 of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 16 may be found, for example, at paragraph [0053] of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 17 may be found, for example, at FIGS. 2 and 5 and paragraphs [0030] and [0045] of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 18 may be found, for example, at FIG. 5 and paragraph [0044] of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 19 may be found, for example, at FIG. 3, paragraphs [0028], [0029], [0031], and [0053], and claim 10 of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Support for claim 20 may be found, for example, at paragraph [0053] of the application as published under U.S. Patent Application Publication No. 2009/0066584.

Claims 13-16 depend directly from independent claim 1, and are submitted as patentable for at least the same reasons given above in connection with claim 1.

Claims 17-20 depend directly from independent claim 10, and are submitted as patentable for at least the same reasons given above in connection with claim 10.

## **CONCLUSION**

It is believed that a full and complete response has been made to the outstanding Office Action and that the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (314) 726-7500.

It is believed that no fees are due in connection with this response. If, however, Applicants owe any fee(s), the Commissioner is hereby authorized to charge such fee(s) to Deposit Account No. **08-0750**. In addition, if there is ever any fee deficiency or overpayment of fees in connection with this patent application, the Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. **08-0750**. In addition, Applicants hereby request the United States Patent & Trademark

Office treat any concurrent or future reply requiring a petition for extension of time pursuant to §1.136 for its timely submission as incorporating therein a petition for an extension of time for the appropriate length of time and authorizes the Commissioner to charge all required extension of time fees that have not otherwise been paid to Deposit Account No. **08-0750**.

Respectfully submitted,

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Dated: February 17, 2010

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